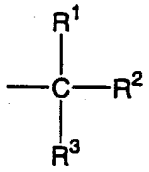
Scope of Claims

1. A positive-working radiation-sensitive composition which is characterized in that it is a positive-working radiation-sensitive composition containing a) a compound with an alkali-soluble group protected by an acid labile group *a* and b) an acid generator which generates acid by irradiation with radiation, and any of the following conditions a1) to a3) are satisfied.

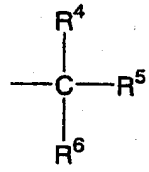
a1) The alkali-soluble group is a carboxyl group and the acid labile group is represented by general formula (1)



(1)

(R^1 and R^2 are aromatic rings, and R^3 represents an alkyl group, a substituted alkyl group, a cycloalkyl group or an aromatic ring; and R^1 to R^3 may be the same or different.)

a2) The acid labile group is represented by general formula (2)



(2)

(R^4 to R^6 are each an alkyl group, a substituted alkyl group, a cycloalkyl group or an aromatic ring, and at least one of R^4 to R^6 is an aromatic ring with an electron-donating group; and R^4 to R^6 may be the same or different.)

a3) The acid labile group *a* has an alkali-soluble group or alternatively the acid labile group *a* has an alkali-soluble group protected by an acid labile group *b*.

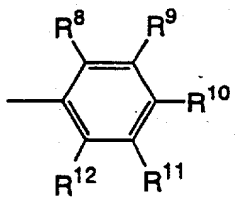
2. A positive-working radiation-sensitive composition according to Claim 1 where condition a1) is satisfied.

3. A positive-working radiation-sensitive composition according to Claim 2 which is characterized in that R^1 to R^3 are each independently an aryl group or a substituted aryl group.

4. A positive-working radiation-sensitive composition according to Claim 1 where condition a2) is satisfied.

5. A positive-working radiation-sensitive composition according to Claim 4 which is characterized in that the alkali-soluble group in the compound meeting condition a2) is a carboxyl group or a phenolic hydroxy group.

6. A positive-working radiation-sensitive composition according to Claim 4 which is characterized in that the aromatic ring with an electron-donating group is of structure represented by general formula (3).



(3)

(R^8, R^{10} and R^{12} each independently represents a hydrogen atom, an alkyl group with 1 to 4 carbons or an alkoxy group with 1 to 6 carbons, and at least one of these represents such an alkyl group or alkoxy group. R^9 and R^{11} each independently

represents a hydrogen atom, an alkyl group with 1 to 4 carbons or an alkoxy group with 1 to 6 carbons.)

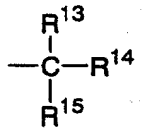
7. A positive-working radiation-sensitive composition according to Claim 4 where the electron-donating group is an alkoxy group with 1 to 6 carbons.

8. A positive-working radiation-sensitive composition according to Claim 1 where condition a3) is satisfied.

9. A positive-working radiation-sensitive composition according to Claim 8 which is characterized in that the acid labile group *a* in the compound meeting condition a3) has at least one phenolic hydroxyl group, or alternatively a phenolic hydroxyl group further protected with acid labile group *b*.

10. A positive-working radiation-sensitive composition according to Claim 8 which is characterized in that the acid labile group *a* in the compound meeting condition a3) has at least one carboxyl group or alternatively a carboxyl group further protected with acid labile group *b*.

11. A positive-working radiation-sensitive composition according to Claim 8 which is characterized in that the labile group *a* in the compound meeting condition a3) is a group represented by general formula (4).

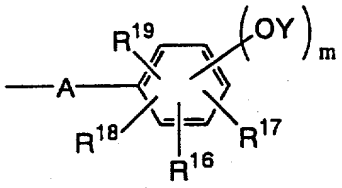


(4)

(R^{13} to R^{15} are each independently an alkyl group, a substituted alkyl group, a cycloalkyl group, an aryl group, a substituted aryl group, a group containing an alkali-soluble

group, or a group containing an alkali-soluble group protected by acid labile group *b*, and at least one is a group containing an alkali-soluble group, or a group containing an alkali-soluble group protected by acid labile group *b*. R^{13} to R^{15} may be the same or different.)

12. A positive-working radiation-sensitive composition according to Claim 11 which is characterized in that at least one of R^{13} to R^{15} in general formula (4) is a group represented by general formula (5) or (6).

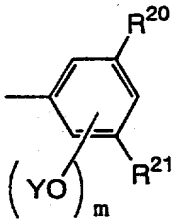


(5)

(6)

(A represents an alkylene group with 1 to 4 carbons, an arylene group with 6 to 10 carbons or a single bond. B represents an alkylene group with 1 to 6 carbons, an arylene group with 6 to 10 carbons, an alkylenearylene group with 7 to 12 carbons or a single bond. R^{16} to R^{19} each independently represents a hydrogen atom or an alkyl group with 1 to 4 carbons. Y represents an acid labile group *b* or a hydrogen atom, and m is 1 to 3.)

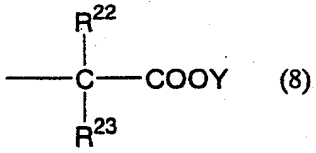
13. A positive-working radiation-sensitive composition according to Claim 11 which is characterized in that at least one of R^{13} to R^{15} in general formula (4) is a group represented by general formula (7).



(7)

(R^{20} and R^{21} each independently represents a hydrogen atom or an alkyl group with 1 to 4 carbons. Y represents an acid labile group *b* or a hydrogen atom, and m is 1 to 3.)

14. A positive-working radiation-sensitive composition according to Claim 11 which is characterized in that at least one of R^{13} to R^{15} of general formula (4) is of structure represented by general formula (8).

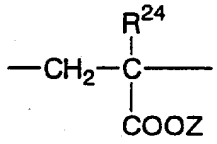


(8)

(R^{22} and R^{23} represent a hydrogen atom or an alkyl group with 1 to 4 carbons. Y represents an acid labile group *b* or a hydrogen atom.)

15. A positive-working radiation-sensitive composition according to Claim 1 which is characterized in that the compound meeting any of conditions a1) to a3) is a polymer of weight average molecular weight from 5,000 to 50,000.

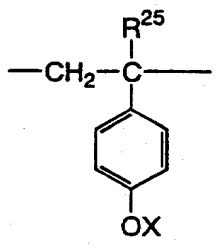
16. A positive-working radiation-sensitive composition according to Claim 1 which is characterized in that the compound meeting any of conditions a1) to a3) is a polymer containing structural units represented by general formula (9).



(9)

(R^{24} represents a hydrogen atom, an alkyl group with 1 to 4 carbons, a cyano group or a halogen. Z is a group represented by general formula (1), (2) or (4).

17. A positive-working radiation-sensitive composition according to Claim 4 or Claim 8 which is characterized in that the compound meeting condition a2) or a3) is a polymer containing structural units represented by general formula (10).



(10)

(R^{23} represents a hydrogen atom, an alkyl group with 1 to 4 carbons, a cyano group or a halogen. X is an acid labile group represented by general formula (2) or (4).

18. A positive-working radiation-sensitive composition according to Claim 16 which is characterized in that R^{24} is a cyano group or a halogen.

19. A method for the production of a pattern in which a positive-working radiation-sensitive composition according to Claim 1 is applied onto a substrate which is to undergo processing, and drying, exposure and development carried out.

20. A method of pattern production according to Claim 19 which is characterized in that the exposure is carried out by means of an electron beam.

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an alkali-soluble group or acid labile group *a* has an alkali-soluble group protected by an acid labile group *b*.

With this constitution, it is possible by means of the present invention to obtain a positive-working radiation-sensitive composition of high sensitivity having a resolution which enables sub-quarter micron pattern processing to be carried out.